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THE MYERS-BRIGGS TYPE INDICATOR AS

A MEASURE OF GENDER STEREOTYPY

A Thesis

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

in

Psychology

by

Eileen Marie Lynch

June 1990

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 Approved by:


Hope Landrine, Ph.D., Chair, Psychology


6/14/90

Date



Martha Kazlo, Ph.D.



Elizabeth Klonoff, Ph.D.


ABSTRACT

This study explored the extent to which the Myers-Briggs Type Indicator (MBTI) measures gender stereotypy rather than inborn personality traits. University student volunteers (N = 212) completed the Bem Sex Role Inventory (BSRI) and the MBTI. The four subscales of the MBTI were correlated with the gender role preference scales of the BSRI, and the relationship between MBTI "cognitive style" (ST, NT, NF, and SF) and gender stereotypy was also analyzed. As hypothesized, the results suggested that approximately 40% of the variance in MBTI cognitive style could be attributed to gender-stereotypy, with the Thinking-Feeling scale accounting for this effect. This suggests that the "cognitive styles" measured by the MBTI may be primarily gender-stereotyped styles (resulting from gender socialization) rather than personality types resulting from the "inborn preferences" theorized by Jung and Myers. It is concluded that the use of the MBTI for personnel and career guidance should be reconsidered.

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INTRODUCTION

The Myers-Briggs Type Indicator, (Briggs & Myers, 1976) appears to be the most widely used personality inventory for non-psychiatric populations in the areas of clinical, counseling and personality testing (Devito, 1985). It frequently is used in vocational counseling to guide individuals in their choice of college majors, professions, occupations and work settings, and increasingly is being used by organizations for personnel selection (Carlyn, 1977; Cowan, 1989; Hirsh, 1985; Moore, 1987; Pinkney, 1983).

The Myers-Briggs Type Indicator (MBTI) sorts individuals into sixteen personality "types" based on the combination of their scores on four "preference" subscales. Although a number of researchers have found that the MBTI-type scores are related to sex, (Brooks & Johnson, 1977; Comrey, 1983; Ferguson & Fletcher, 1987; Myers & McCaulley, 1985; Ross, 1966; Stricker & Ross, 1964; Tiberia, 1977) there appear to be no studies that endeavor to account for these sex differences. Nonetheless, the strength of the relationship between MBTI scores and sex raises the possibility that the MBTI measures gender-role stereotypy rather than dimensions of personality per se. Since the MBTI is used to make hiring decisions and to guide individuals in their selection of careers, it becomes important to examine the extent to

which the MBTI measures gender roles, and to investigate the extent to which we may be selecting individuals for jobs and guiding them into fields based on their gender-role stereotypy alone.

The MBTI is based on Carl Jung's type theory of personality as it was interpreted by Isabel Briggs-Myers and Katherine Briggs (Myers & Myers, 1980). Jung (1923/1971) argued that most ostensibly random individual differences can be accounted for by subtle differences in the cognitive styles we use to process the input of the world. The cognitive styles, or "preferences" to which Jung referred were Sensing, Intuition, Thinking and Feeling. Myers asserted that these preferences "are inborn and no attempt should be made to reverse them; otherwise development may be blocked" (Myers & Myers, 1980, p. 175).

Jung described four distinct ways of processing information: Sensing (S), in which information is processed directly through the five senses; Intuition (N), in which information is processed through unconscious ideas or associations and is expressed in hunches or "just knowing"; Thinking (T), in which logical, analytical processes are used to process information in impersonal terms; and Feeling (F), in which information is processed through subjective, emotional values.

Jung (1923/1971) theorized that another basic difference in people's cognitive styles stems from their interest

in the outer and inner worlds. An Extravert (E) draws energy from the outer world of people and things, whereas an Introvert (I) draws energy from the inner world of concepts and ideas. In addition to these scales, Myers (1962) added a "preference" scale of her own to the instrument, the choice between the Judging (J) attitude and the Perceptive (P) attitude. This scale measures the extent to which a person prefers order, predictability and structure (J), as opposed to ambiguity and spontaneity (P) (Ross, 1966; Stricker & Ross, 1962; Mcrae & Costa, 1989). The MBTI therefore has four subscales: Extraversion versus Introversion (EI), Sensing versus Intuition (SN), Thinking versus Feeling (TF), and Judgment versus Perception (JP). These scales are combined to yield sixteen cognitive style-preference types.

Detailed descriptions of each of the types are provided by the test authors (Myers, 1980; Myers & Myers, 1980) and are used to interpret MBTI scores. Summaries of these descriptions are given below.

Sensing Types

Sensing types depend on their five senses for processing information: "Whatever comes directly from the senses is part of the sensing type's own experience and therefore trustworthy. What comes from other people indirectly through the spoken or written word is less trustworthy"

(Myers & Myers, 1980, p.57). If people prefer sensing, they "become expert at noticing and remembering all the observable facts. Because of their ever-growing fund of experience and knowledge of reality, sensing types tend to become realistic, practical, observant, fun-loving and good at working with a great number of facts" (p.200). Sensing types focus on what they see, hear, touch, taste and smell and are thus viewed as "observant" and very dependent on their physical surroundings: "Desiring chiefly to possess and enjoy, and being very observant, they are imitative, wanting to have what other people have and to do what other people do ..." (p.63). They "dislike intensely any and every occupation which requires the suppression of sensing, and are most reluctant to sacrifice present enjoyment to future gain or good." They "prefer the art of living in the present to the satisfactions of enterprise and achievement," yet they "contribute to the public welfare by their support of every form of enjoyment, recreation, and every variety of comfort, luxury, and beauty" (p.63). Finally, they "are most likely to shine in courses involving many solid facts, like history, geography, civics, or biology."

Intuitive Types

Intuitives depend not on the senses, but on intuition, and thereby primarily attend to and process meanings, relationships and possibilities. People who prefer intuition as their dominant cognitive style tend to become skilled at

seeing possibilities: "They learn that a possibility will come to them if they confidently seek it. Valuing imagination and inspirations, intuitive types become good at new ideas, projects, and problem-solving" (Myers & Myers, p. 200). They "are by nature initiators, inventors and promoters; having no taste for life as it is, and small capacity for living in and enjoying the present, they are generally restless" (p.63). They "dislike intensely any and every occupation which necessitates sustained concentration on sensing, and are willing to sacrifice the present to a large extent since they neither live in it nor particularly enjoy it" (p.63). They are said to "contribute to the public welfare by their inventiveness, initiative, enterprise, and powers of inspired leadership in every direction of human interest" (p.63).

Thinking Types

Thinking types are described as those who value logic as a means for processing or evaluating information. They devalue sentiment and feeling and suppress both. They tend to be "firm-minded" and "analytically oriented, responding more easily to people's thoughts than to their feelings" (Myers, 1980, p.8). Thinkers "do not show emotion readily and are often uncomfortable dealing with people's feelings" (Myers, 1980, p.8). They are said to be "stronger in executive ability than in the social arts" and "more interested

in things than in human relationships" (Myers & Myers, 1980, p. 68). If a thinking type "is forced to choose between truthfulness and tactfulness, [the thinker] will usually be truthful" (p.68). Because they are "naturally brief and businesslike, they often seem to lack friendliness and sociability without knowing or intending it" (p.68). They "are usually able to organize facts and ideas into a logical sequence that states the subject, makes the necessary points, comes to a conclusion, and stops there without repetition" (p.68). Thinking types are said to "contribute to the welfare of society by the intellectual criticism of its habits, customs, and beliefs, by the exposure of wrongs, the solution of problems, and the support of science and research for the enlargement of human knowledge and understanding" (p.68). They are "more often men than women, and when married to a feeling type naturally become the guardian of the spouse's neglected and unreliable thinking" (p.68).

Feeling Types

Feeling types "value sentiment over logic", "tend to be sympathetic", and "are more interested in people than in things" (Myers & Myers, 1980, p.68). They are "stronger in the social arts than in executive ability," and "if forced to choose between tactfulness and truthfulness, [they] will usually be tactful" (p.68). They "are likely to agree with those around them, thinking as other people think, believing them probably right" (p.68). Because they process and

recall the feelings (rather than the sensory information or facts) of a situation, they "usually find it hard to know where to start a statement or in what order to present what they have to say. [They] may therefore ramble and repeat themselves, with more detail than a thinker wants or thinks necessary" (p.68). They "tend to be very aware of other people and their feelings", and "enjoy pleasing people, even in unimportant things" (p.163). They value and need social harmony. Their "decisions [are often] influenced by their own or other people's personal likes and wishes" and they "dislike telling people unpleasant things" (Myers & Myers, 1980, p. 163). Feeling types are said to "contribute to the welfare of society by their loyal support of good works and those movements, generally regarded as good by the community, which they feel correctly about and so can serve effectively" (Myers, 1980, p.68).

Thus, feeling types are described as less logical, more tender-hearted, more yielding, more social, more sensitive, less analytical, more gullible, and more inclined to take things personally than thinking types, while thinking types are described as more logical, more "firm-minded", more analytically oriented, less social, less sensitive, and more skilled in leadership than feeling types. These two descriptions match the gender stereotypes of women and men, respectively, (Bem, 1974; Broverman, Vogel, Broverman, Clarkson, & Rosenkrantz, 1972; McKee & Sheriffs, 1957; Ruble & Ruble,

1980; Sherriffs & Mckee, 1957; Spence & Helmreich, 1978). Indeed, Jung noted in 1923 that: "feeling is undeniably a more obvious characteristic of feminine psychology than is thinking, [and so] the most pronounced feeling types are to be found among women" (p.357).

Preferences on the Thinking-Feeling scale show the most marked sex differences. In large normative data samples (e.g., Myers & McCaulley, 1985), approximately sixty percent of men score as Thinking and forty percent as Feeling, whereas about 33% of women score as Thinking and 66% as Feeling. These data probably represent an underestimation of the sex differences on this scale because the scoring emphasizes the dichotomy: Men scored as feeling and women scored as thinking often had only a slight preference in those directions (i.e., a low score). Numerous researchers have noted the significant sex differences on this scale, with women preferring feeling and men preferring thinking (Brooks & Johnson, 1977; Comrey, 1983; McCrae & Costa, 1989; Ross, 1966; Stricker & Ross, 1964; Tiberia, 1977).

Myers (1980) argues that it is the preference on the Feeling-Thinking scale, combined with the preference on the Sensing-Intuition scale, that is the most important in determining academic and occupational choices. She argues that each of the four combinations of cognitive styles produces distinct differences in interests, values, needs and skills. The ST types process information through sens-

ing, and evaluate information through thinking. Thus, "their main interest focuses upon facts, because facts can be collected and verified directly by the senses--by seeing, hearing, touching, counting, weighing, measuring. ST people approach their decisions regarding these facts by impersonal analysis, because of their trust in thinking, with its step-by-step logical process of reasoning from cause to effect, from premise to conclusion" (p. 200). Their personalities tend to be "practical and matter-of-fact, and their best chances of success and satisfaction lie in the fields that demand impersonal analysis of concrete facts, such as economics, law, surgery, business, accounting, production, and the handling of machines and materials" (p. 200).

The SF types also rely on sensing for processing information, but they prefer feeling for purposes of judgment. They "approach their decisions with personal warmth, because their feeling weighs how much things matter to themselves and others. They are more interested in facts about people than in the facts about things and, therefore, they tend to be sociable and friendly. They are most likely to succeed and be satisfied in work where their personal warmth can be applied effectively to the immediate situation, as in pediatrics, nursing, teaching (especially elementary), social work, selling of tangibles, and service-with-a smile jobs" (Myers, 1980, p.6).

The NF Types are said to possess the same personal

warmth as the SF types because of their use of feeling for evaluating information; but, because the NF's use intuition to process information, they do not center their attention upon the concrete situation: "Instead they focus on possibilities, such as new projects ... or new truths. The new project or the new truth is imagined by the unconscious processes and then intuitively perceived as an idea that feels like an inspiration" (Myers, 1980, p.6). They seek and follow up possibilities with personal warmth, enthusiasm, and commitment: "Often they have a marked gift of language and can communicate both the possibility they see and the value they attach to it. They are most likely to find success and satisfaction in work that calls for creativity to meet a human need. They may excel in teaching (particularly college and high school), preaching, advertising, selling, counseling, clinical psychology, psychiatry, writing, and most fields of research" (Myer, 1980, p.7).

The NT combination also uses intuition to process information but uses thinking to evaluate that information: "Although they focus on a possibility, often they choose a theoretical or executive possibility and subordinate the human element" (Myers, 1980, p.7). NT's "tend to be logical and ingenious and are most successful in solving problems in a field of special interest whether scientific research, electronic computing, mathematics, the more complex aspects of finance, or any sort of development or

pioneering in technical areas" (p. 7).

From these descriptions, it appears that the traits attributed to ST's and NT's are most similar to our concept of stereotypical masculinity, with the ST type being the most prototypically masculine. In contrast, (the descriptions of SF's and NF's match concepts of stereotypical femininity, with the SF being the most prototypically feminine. (Thus, ranked from high masculine gender-stereotypy to high feminine gender-stereotypy the types are ST, NT, NF and SF.)

From the literature reviewed here it appears that the first two types would be advised to consider executive positions, business or science, while the latter two would be advised to consider teaching, counseling, the humanities and arts, and nonadministrative positions.

Although the descriptions and the distributions of the types, as well as some research on their external correlates (see Myers & McCaulley, 1985, p. 177-178) suggest that gender-stereotypy is related to this typology, there has been only one study investigating the relationship between MBTI Type scores and gender stereotypes as measured by the Bem Sex Role Inventory (Bem, 1974). Padgett, Cook, Nunley, and Carskadon (1982) investigated the relationship between androgyny and type preferences on the MBTI. On the TF dimension, androgynous women were more likely than feminine women to identify themselves as thinking types. No significant differences were found between feminine and androgynous

women on the SN scale. There were also no significant differences found on combinations of the SN and TF scales for women. For the male subjects, androgynous men were far more likely to be categorized as feeling types than were masculine men. There were no significant differences found between androgynous and masculine men on the EI, SN or JP scales. However, there were significant differences found between androgynous and masculine males when combinations of the SN and TF scales were examined: NT and ST men were more likely to be sex-typed masculine, whereas NF and SF men were more likely to be androgynous.

Although this study provides some support for the hypothesis that the combination of the SN and TF scales measures gender-stereotypy, it has several limitations. One obvious source of concern is the use of the dichotomous scoring system (rather than that of the continuous scores) on the MBTI. Because the dichotomous scoring does not account for the strength of preference, it loses a large percentage of the variance, and leads to a small, artificially shrunk correlation. The use of only dichotomous type scores is thus questionable (McCrae & Costa, 1989). Furthermore, dichotomous scoring also misclassifies many of the individuals who are near the cutting point and fails to address the significant differences that may be found between those with strong and weak preferences within any one type. In addition, Padgett et al. (1982) focused only on

the type differences between androgynous and sex-typed individuals and failed to examine the overall relationship between the MBTI scales and the BSRI scales.

The purpose of this study was to examine the relationship between the various MBTI scales, (as independent continuous scales and as combined types) and masculinity and femininity as measured by the BSRI. The results should have important theoretical and practical implications. If MBTI scores are strongly related to gender stereotypy, an underlying theory of the inventory--that these cognitive styles measure inborn preferences--would be questionable. Furthermore, the use of the test would need to be re-examined because personnel selection, career counseling and vocational guidance should not be based on a person's gender role stereotypy. This would be equivalent to guiding stereotypically feminine women into stereotypically feminine fields (e.g., teaching, nursing and social work) and guiding stereotypically masculine men into stereotypically masculine fields (e.g., business, science and politics). Using an assessment tool that measures gender stereotypy rather than the purported inborn personality preferences would perpetuate gender stereotyping in career and guidance counseling and in personnel selection.

The scale that seems to most clearly match gender stereotypes is the Thinking-Feeling scale; thus, it is hypothesized that the subjects' preference score for Think-

ing will be most strongly predicted by their Bem Masculinity score, and their preference score for Feeling will be most strongly predicted by their Bem Femininity score. Drawing from the descriptions of the types provided by Myers (1980), it is predicted that the Sensing types will score as more gender stereotyped than the Intuitive types. Therefore, it is hypothesized that ST's will have the highest Bem Masculinity scores, followed by NT's, followed by NF's, followed by SF's with the lowest Bem Masculinity score. Likewise, it is hypothesized that SF's will have the highest Bem Femininity score, followed by NF's, followed by NT's, followed by ST's with the lowest Bem Femininity scores. Finally, it is predicted that the well-known sex (biological maleness and femaleness) differences on the MBTI will be minimal when gender role preference (masculinity versus femininity which may not be related to sex) is included. Gender-stereotypy, rather than sex, is expected to account for the well-known sex differences on ST (men) versus SF (women).

METHOD

Subjects

The sample consisted of 54 male and 158 female undergraduate and graduate volunteers at California State University, San Bernardino. The sample was predominantly white (97%), and the subjects' ages ranged from 19 to 58 years ($M = 29$, $S.D. = 9$). The majority of the subjects (70%) were drawn from psychology classes (Tests and Measures and Abnormal Psychology). The remaining subjects were drawn from other departments (including business, fine arts, and chemistry).

Measures

The Myers-Briggs Type Inventory (Form F) consists of 166 forced choice responses. Scoring keys are provided for each preference (e.g. both S and N, both T and F, etc.), and there are separate scoring keys for females and males on the TF scale. Preferences were determined by the greater of the two preference scores, and a two-letter code (ST, NT, SF, or NF) specified the subject's classification into one of the four types. Four continuous scores that corresponded to the four bipolar preference scales of Extraversion-Introversion (EI), Sensing-Intuition (SN), Thinking-Feeling (TF) and Judging-Perceiving (JP) were also obtained. Continuous

scores are a linear transformation of preference scores and were calculated using the following convention specified by Myers and McCaulley (1985). For E, S, T, or J preference scores, the continuous score is 100 minus the numerical portion of the preference score. For I, N, F, or P preference scores, the continuous score is 100 plus the numerical portion of the preference score. For example, a preference score of S = 15 is represented by an SN continuous score of 85; a preference score of N = 25 is represented by an SN continuous score of 125.

The Bem Sex Role Inventory (Bem, 1974) is a self-report scale designed to measure the extent to which people view stereotypically masculine and/or stereotypically feminine traits as descriptive of them. The scale consists of 60 items, 20 representing stereotypically masculine characteristics, 20 representing stereotypically feminine characteristics and 20 unscored, neutral items. The subject's degree of agreement with each item as a description of him/herself is indicated on a scale of 1 (Never or almost never true) to 7 (Always or almost always true) and is labeled at each point. The scores are summed for each scale yielding a masculinity score and a femininity score for each subject (range = 20 to 140). A "Bem Difference" score, consisting of the Bem Masculinity score minus the Bem Femininity score, was also calculated for each subject with a positive score indicating greater stereotypical masculinity than femininity

(masculine subjects) and a negative score indicating greater stereotypical femininity than masculinity (feminine subjects).

Procedure

Volunteer subjects completed a personality questionnaire consisting of the Myers-Briggs Type Indicator (Form F) and the Bem Sex Role Inventory and received extra course credit. The questionnaires were distributed to professors who subsequently instructed volunteer students to complete them at their convenience. The questionnaires were then collected by the professors the following week. The students in the Tests and Measures classes received their results during class discussion of the MBTI. The remaining students received written descriptions of their results as well as an opportunity to discuss their results with the experimenters.

RESULTS

To examine the relationship between the four MBTI preference scales (EI, SN, TF and JP) and the BSRI scales (Masculinity, Femininity, and Bem Difference) a bivariate correlation matrix was obtained and is shown in Table 1. As indicated in Table 1, the Bem Difference score (Bem Masculinity minus Bem Femininity) was strongly related to the Thinking-Feeling (TF) scale ($r = -.70$, $p < .01$) in the predicted manner. As Feeling scores increased, feminine gender-stereotypy increased, and as Thinking scores increased masculine gender-stereotypy increased. The TF scale also was strongly correlated with the Bem Femininity scale ($r = .53$, $p < .01$) and with the Bem Masculinity scale ($r = -.58$, $p < .01$) in the manner hypothesized. As Feeling scores increased, Bem Femininity scores increased and as Thinking scores increased, Bem Masculinity scores increased. The other three preference scales (EI, SN, and JP) were not significantly related to the BSRI scales.

Table 1

Correlation Matrix of All Variables

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
1.Sex	1.0							
2.EI	-.07	1.0						
3.SN	-.06	-.06	1.0					
4.TF	.27	-.15	.18	1.0				
5.JP	-.15	.01	.37	.09	1.0			
6.Bem Mas	-.40	-.12	.02	-.58	.07	1.0		
7.Bem Fem	.29	-.17	.10	.53	-.05	-.30	1.0	
8.Bem Dif	-.45	.01	-.04	-.70	-.07	.87	-.73	1.0

In order to test the hypotheses regarding the relationship between MBTI scores and gender-stereotypy, a multivariate analysis of variance (MANOVA) was conducted using BMDP4V. The MANOVA contained one independent (grouping) variable, MBTI cognitive style (ST, NT, NF and SF), and four dependent variables (Bem Masculinity, Bem Femininity, Bem Difference and sex). If these cognitive styles are actually gender-socialized ways of processing information, then the four groups should differ on Bem Masculinity, Bem Femininity and Bem Difference in this manner: The ST Type should have the highest Bem Masculinity scores, followed by NT, followed by NF, followed by SF with the lowest Bem Masculinity scores. The SF Type should have the highest Bem Femininity

scores, followed by NF, followed by NT, followed by ST with the lowest Bem Femininity scores. Bem Difference scores should be highest for the ST group, followed by NT, followed by NF, followed by SF. Furthermore, the major differences between these groups should be gender-stereotypy (the three BSRI scales) rather than sex differences.

The independent variable (cognitive style) consisted of four groups: ST ($n = 44$), NT ($n = 51$), NF ($n = 76$) and SF ($n = 41$). Sex was dummy coded 0 = male ($n = 54$) and 1 = female ($n = 158$).

The multivariate analysis of variance indicated that the four MBTI groups differed significantly on the overall, best weighted, linear composite of the four dependent variables ($L \text{ Ratio} = .56572$, $F = 10.86$, $df = 12$, $p < .01$). The MANOVA was followed by a series of one-way ANOVA's and these are given in Table 2, along with the means for the groups on each of the dependent variables.

An inspection of the means revealed that Bem Masculinity scores decreased across the four groups in the manner predicted: ST had the highest mean masculinity score followed by NT, followed by NF, followed by SF. Mean Bem Femininity scores did not differ between the two Feeling groups (SF and NF), but did decrease in the manner predicted for the NT and ST groups. Using Bem Difference (Bem

Table 2

ANOVAS and Means for Each Group

	<u>ST</u>	<u>NT</u>	<u>NF</u>	<u>SF</u>	<u>SS</u>	<u>F</u> ^a
	(<u>n</u> =44)	(<u>n</u> =51)	(<u>n</u> =76)	(<u>n</u> =41)		
<u>Variable</u>	<u>M</u>	<u>M</u>	<u>M</u>	<u>M</u>		
Bem Mas	110.36	107.47	94.01	88.66	15,537.41	33.42
Bem Fem	92.45	94.18	103.05	102.95	4,940.67	14.52
Bem Diff	17.91	13.47	-9.04	-14.29	37,759.82	47.12
Sex	.61	.61	.80	.95	3.71	7.05

a = $p < .01$, df = 3, 208 for each F above.

Masculinity minus Bem Femininity) as a measure of gender-stereotypy (where positive equals more masculine than feminine, negative equals more feminine than masculine) the group means can be ranked from high masculine gender stereotypy to high feminine gender-stereotypy: ST, NT, NF, and SF. The magnitude of the F's revealed that gender-stereotypy (Bem Difference) was the variable that most strongly differentiated the types ($F = 47.12$). Although there were more women in the groups hypothesized to be stereotypically feminine (NF and SF) such that sex did differentiate the four groups, the effect of sex ($F = 7.05$) was minor relative to that of gender-stereotypy ($F = 47.12$); gender-stereotypy

was nearly seven times more powerful as a discriminator of these groups than was sex.

All pairwise comparisons of the means of the four groups using the Scheffe Method (at $\alpha = .05$) were computed, and these are shown in Table 3. The two Thinking Types (ST and NT), did not differ from each other on Bem Masculinity, Bem Femininity, or on Bem Difference. Likewise, the two Feeling Types (NF and SF), did not differ from each other on Bem Masculinity, Bem Femininity, or on Bem Difference. But, as predicted, the two Thinking Types differed from the two Feeling Types on Bem Masculinity, Bem Femininity, and Bem Difference. The only groups which differed by sex were SF (female) and ST (male), and, SF (female) and NT (male).

Table 3

Post Hoc Comparison Using Scheffe at Alpha = .05

	<u>ST/NT</u>	<u>NF/SF</u>	<u>NF/ST</u>	<u>NF/NT</u>	<u>SF/ST</u>	<u>SF/NT</u>
Bem Mas	NS	NS	48.09	35.68	64.51	51.89
Bem Fem	NS	NS	27.61	21.21	25.88	15.41
Bem Diff	NS	NS	75.81	57.91	82.42	65.56
Sex	NS	NS	NS	NS	13.94	14.93

Note. Adjusted Critical F (3,208) = 7.8.

These MANOVA results supported the hypotheses. They

were followed by a multiple-regression analysis intended to discover the amount of variance in MBTI Type (cognitive style) accounted for by sex and by the various measures of gender-stereotypy.

An All Possible Subsets Regression Program (BMDP-9R) was selected as the type of regression for this analysis. This stepwise regression analysis selects the single best predictor, the best subset of two predictors, three predictors and so forth until all variables have been included, and then selects the "best subset" of N predictors. BMDP-9R defines "best predictor(s)" as the variable or linear combination of some subset of the variables that maximizes R^2 --i.e., that accounts for the most variance in the dependent variable. For the multiple regression analysis, a subsample of the subjects ($N = 160$) was randomly selected to ensure an equal number of subjects (40) in each cell (ST, NT, NF, SF). Four independent variables (Sex, Bem Masculinity, Bem Femininity, and Bem Difference) were entered into the analysis to predict MBTI type where type and sex were dummy coded. The results of this regression are presented in Table 4, where Mallows' CP was the criterion for the stepwise selection of variables; R is the multiple correlation between the variable(s) and MBTI type, and R^2 is the squared multiple correlation (variance in MBTI type accounted for by the variables).

Table 4

All Best Subsets of Variables Predicting MBTI Type

<u>Best Subsets</u>	<u>Mallow's CP</u>	<u>R</u>	<u>R²</u>	<u>% Variance</u>	<u>T</u>
<u>Best 1</u>					
Bem Difference	2.16	.628	.394	39.4	10.14
<u>Best 2</u>					
Bem Femininity +	2.91	.632	.399	39.9	1.12
Bem Difference					7.72
<u>Best 3</u>					
Bem Masculinity +	3.01	.637	.406	40.6	-1.38
Bem Femininity +					1.48
Bem Difference					1.74
<u>All 4</u>					
Sex +	5.0	.637	.406	40.6	
Bem Masculinity +					
Bem Femininity +					
Bem Difference					

As indicated in Table 4, the single best predictor of type was Bem Difference, which accounted for 39.4% of the variance in type. As Bem Difference increased (indicating greater masculine gender-stereotypy) type moved to (was more

likely to be) NT or ST. The best subset of two predictors was Bem Difference followed by Bem Femininity, accounting for 39.9% of the variance in MBTI type. As Bem Femininity scores and Bem Difference scores increased, type moved to (was more likely to be) NT or ST. Adding another predictor to the equation (Bem Masculinity) only increased R^2 by .007. Adding the fourth predictor (sex) increased R^2 by only 0.00005. Therefore, the best possible subset chosen by the program was that with only one predictor, Bem Difference, because it alone accounted for a significant percentage of the variance in MBTI type. The statistics for this best predictor are presented in Table 5.

Table 5

Statistics for the Best Predictor of MBTI Type

Mallow's CP	2.16
Squared Multiple Correlation	.394
Multiple Correlation	.627
Residual Mean Square	1.533
Standard Error of Estimate	1.238
F	102.84
Numerator Degrees of Freedom	1
Denominator Degrees of Freedom	158
Significance (Tail Probability)	.0000.

Variable	Regression <u>Coefficient</u>	t	p	Contribution to R ²
Bem Diff	.044	10.14	.000	.394

As predicted, a significant percentage of the variance in MBTI type (cognitive style) was accounted for by gender-stereotypy, and sex was not a powerful predictor once gender-stereotypy was included.

DISCUSSION

The results of the bivariate correlations indicate that 49% of the variance in the Thinking-Feeling scale of the MBTI is related to gender stereotypy, as hypothesized. In addition, the MANOVA results revealed that MBTI cognitive styles (ST, NT, NF, SF) are also strongly related to gender stereotypy. Gender-stereotypy (as measured by Bem Difference) was found to be the variable which most strongly differentiated the four groups ($F = 47.12$), and sex had the least effect ($F = 7.05$). As hypothesized, the two Thinking types (NT and ST) differed from the two Feeling types (NF and SF) on Bem Masculinity, Bem Femininity, and Bem Difference. Although the description of the types suggested that the ST type was more prototypically masculine than the NT type, these two types did not differ from each other on any of the measures of gender-stereotypy. Likewise, the SF type, hypothesized to be more prototypically feminine than the NF type, did not differ from the NF type on Bem Masculinity, Bem Femininity, or Bem Difference. The failure to find differences between the two feminine groups and the two masculine groups may be due to the small sample size of each group and the conservatism of the Scheffe post hoc test. However, these results, along with the results from the bivariate correlations, do suggest that it is the Thinking-

Feeling scale of the MBTI that measures the gender stereotypy differences found here.

The results of the MANOVA were confirmed by the multiple regression analysis which revealed that gender stereotypy alone--but not sex--accounted for nearly 40% of the variance in MBTI type. One obvious source of concern regarding this regression analysis is that both sex and MBTI type had to be dummy coded (assigned numbers), and 52 subjects had to be dropped to ensure that the n's across the cells would be equal. Dropping subjects to ensure equal cells was done in an attempt to eliminate a spurious multiple correlation resulting from radically unequal n's. However, dropping 52 subjects necessarily alters the regression to the mean (and the range of scores) and probably artificially shrunk the final R of .63. Furthermore, although the dummy codes chosen for type (-2, -1, 1, 2) were codes that sum to zero and thereby decrease the effect of the codes themselves on R, all codes of any sort necessarily alter R by altering the product of the moments. Therefore, it is difficult to know what R would have been in the absence of dummy codes and of dropping subjects, because both may have inflated or shrunk R. To understand the meaning of the $R = .63$ for Bem Difference in the regression, one must return to the MANOVA where the F's were based on the total sample and type was not dummy coded.

An examination of the F's from Table 2 indicates that

the largest difference between the types was on Bem Difference ($F = 47.12$), which was far larger than the F for Bem Masculinity, Bem Femininity, or Sex. In Table 6, the F 's and Sums of Squares from Table 2 are compared to the regression results of Table 4.

Table 6

Comparison of MANOVA and Multiple Regression Results

	MANOVA <u>SS</u>	MANOVA <u>F</u>	CONTRIBUTION TO <u>REGRESSION</u>
Bem Diff	37,759	47.12	.394
Bem Masc	15,537	33.42	.017
Bem Fem	4,940	14.52	.004
Sex	3.71	7.05	.000

Table 6 suggests that the regression results--despite dummy coding and 52 missing subjects--closely parallel the MANOVA and ANOVA results, such that the R of .63 for gender stereotypy might be accepted as reasonably accurate. Thus, it is likely that approximately 40% of the variance in MBTI cognitive styles can be attributed to gender stereotypy, with the Thinking-Feeling scale accounting for this effect. These MANOVA, ANOVA, and regression results suggest that the

"cognitive styles" measured by the MBTI may be primarily gender stereotyped styles (resulting from gender socialization), rather than personality types resulting from the "inborn preferences" theorized by Jung and Myers. Counselors and employers need to be sensitive to this possibility when interpreting MBTI scores, and should reconsider the use of this inventory for personnel selection and career guidance. Replication with larger samples of more ethnically diverse, non-student populations will be crucial for evaluating the meaning of the results of this study, and for better establishing the relationship between MBTI scores and gender-stereotypy.

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